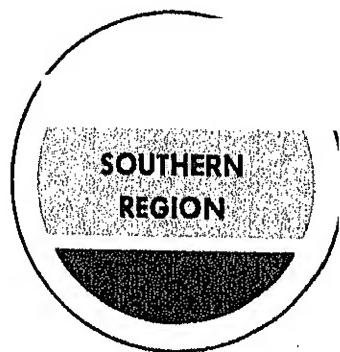


**COOPERATIVE SWEET SORGHUM  
VARIETY TESTS FOR SUGAR  
DURING 1970  
IN FOUR SOUTHERN STATES**

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**ARS-S-26**  
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# COOPERATIVE SWEET SORGHUM VARIETY TESTS FOR SUGAR DURING 1970 IN FOUR SOUTHERN STATES

By Kelly C. Freeman, Dempsey M. Broadhead, Otto H. Coleman, and Natale Zummo<sup>1</sup>

## SUMMARY

Fourteen varieties of sweet sorghum were evaluated for potential sugar production at one or more locations. 'Mer. 68-7' and 'Mer. 68-10' produced more sugar per ton of stalks than 'Rio' (standard) in seven of nine and eight of eleven tests respectively. 'Mer. 64-3' ('Roma') exceeded 'Rio' by 44 percent in pounds of sugar per acre at Weslaco, Tex. Drought of various degrees and periods of duration extended the development period (planting to harvest) for some varieties.

## INTRODUCTION

Experimental plots designed to test eleven sweet sorghum varieties for sugar were planted in four southern states—Georgia, Louisiana, Mississippi and Texas. These tests were conducted in cooperation with several agencies and the U. S. Sugar Crops Field Station, Meridian, Miss. (A complete list of cooperating stations and personnel appears at the front of this report).

## TEST VARIETIES AND METHODS

All tests included varieties 'Rio' and 'Mer. 68-10' and all except Weslaco, Tex. included 'Mer. 67-1' and 'Mer. 67-15'. 'Mer. 64-7', 'Mer. 67-14', and 'Mer. 68-7' were included in tests in Georgia, Louisiana, and Mississippi. The varieties 'Mer. 56-15', 'Mer. 63-3', 'Mer. 66-1' and 'Brawley' were included at Lubbock, Tex. and 'Mer. 64-3' ('Roma'), 'Mer. 65-2' and 'Mer. 67-17' were included in the test at Weslaco, Tex.

A randomized complete block design with five

replications of each variety was used. Each plot included three rows, with an area of 1/200-acre. The seed in most tests was planted with hill-drop planters, and the plants were thinned to three or four per hill. In remaining tests the seed was drilled with a spout drill and the plants were thinned to 6- to 8-inch spacing. The plots were cultivated with conventional tractor cultivators. All sorghum was harvested when the seed was ripe.

Ten to thirty stalks from each plot were milled to obtain juice for Brix and sucrose analysis. At Meridian, Miss.; Cairo, Ga.; and Houma, La. the stalks were harvested and milled, and the juice analyzed the same day. At Weslaco, Tex., the stalks were milled immediately after harvest, but the juice was quick-frozen and analyzed later.

The stalk samples from Baton Rouge and Bossier City, La. and from Lorman, Poplarville, State College, and Stoneville, Miss. were milled within 24 hours after harvest. The juice from the stalk samples at Lubbock, Tex. was treated with mercuric chloride and shipped to Meridian for analysis.

## RESULTS AND DISCUSSION

Table 1 shows yield of stripped stalks in percentage of 'Rio'. Data for 'Rio', the standard variety, is in tons of stalks per acre. 'Rio' averaged 14.7 tons of stalks per acre and ranged from 11.0 to 21.0 tons at Poplarville and Meridian, Miss., respectively. 'Mer. 64-7' and 'Mer. 67-15' were 116 and 104 percent of 'Rio' in stalk yield. All other varieties, except 'Mer. 64-3' ('Roma') 'Mer. 65-2' and 'Mer. 67-17' at Weslaco, Tex. were lower in stalk yield than 'Rio'. 'Mer. 64-' ('Roma'), 'Mer. 65-2' and 'Mer. 67-17' at Weslaco, Tex. were 151, 135 and 116 percent of 'Rio' in yield of stalks per acre.

<sup>1</sup> Agronomists and pathologist, U. S. Sugar Crops Field Station, Southern Region, Agricultural Research Service, U. S. Department of Agriculture, Meridian, Miss. 39301.

Table 2 shows degrees Brix of extracted juice of varieties, in percentage of 'Rio' Brix. 'Rio' juice averaged 19.4 degrees Brix. The 14.9 Brix of 'Rio' at Houma, La. was unusually low. 'Mer. 68-10' had a higher Brix than 'Rio' at all locations except Poplarville, Miss. 'Brawley' Brix was 112 percent of 'Rio' at Lubbock, Tex. 'Mer. 64-3' ('Roma') and 'Mer. 65-2', which are varieties exhibiting potential for commercial culture, had Brix readings of 98 and 94 percent of 'Rio'.

Sucrose as a percentage of 'Rio' yield is presented in table 3. 'Mer. 67-1', 'Mer. 67-15', 'Mer. 68-7' and 'Mer. 68-10' were higher in sucrose than 'Rio'. At Lubbock, Tex., 'Mer. 56-15', 'Mer. 66-1' and 'Brawley' were higher than 'Rio' in sucrose.

Table 4 lists the apparent purity of sucrose as a percentage of 'Rio' purity. The mean apparent purity for 'Rio' was 74.2 percent. The purity of 'Rio' at Cairo, Ga. and Stoneville, Miss. was unusually low, which is reflected in a higher-than-expected mean percentage for 'Mer. 64-7', 'Mer. 67-1', 'Mer. 67-14', 'Mer. 67-15', 'Mer. 68-7' and 'Mer. 68-10'.

Calculated sugar per ton of stalks of the varieties as a percentage of 'Rio' sugar yield is shown in table 5. The poor performance of 'Rio' at Cairo, Ga. resulted in a higher mean percentage for 'Mer. 64-7', 'Mer. 67-1', 'Mer. 67-14', 'Mer. 67-15', 'Mer. 68-7' and 'Mer. 68-10' than expected.

Table 6 shows calculated sugar per acre as a percentage of 'Rio' yield per acre. The most significant item in this year's test results was the yield of 'Mer. 64-3' ('Roma') (144% of 'Rio')

at Weslaco, Tex. Weather conditions for early development of plants was extremely poor at Cairo, Ga. Improved later weather conditions favored later maturing varieties.

Table 7 shows the number of days from planting to harvest. 'Rio' averaged 126 days from planting to harvest and ranged from 98 at Bossier City, La. to 155 at Baton Rouge, La. The number of days from planting to harvest is related to rainfall during the growing season. The conditions at Meridian, Miss. (one irrigation) and Weslaco, Tex. (three irrigations) favored uninhibited development of the plants, whereas in other locations drought of various degrees and duration extended the development period for some varieties.

Table 8 contains data on diseases of economic importance on fourteen sweet sorghum sugar varieties. Diseases were rated on a scale of 0 to 4, with four representing destruction of 25% or more of leaf tissue. 'Mer. 67-14' was susceptible to anthracnose at Meridian, Miss. Every variety had gray leaf spot infection at one or more locations, except at Lubbock, Tex., where no disease was of economic importance. Symptoms of gray leaf spot appeared on the leaves late in the growing season, and though extensive in destruction of leaf tissue, the disease did not greatly reduce the quality of the stalk juice.

Rust ratings of 3 or above were recorded on 'Mer. 64-7' and 'Mer. 68-7' at Houma, La. and on 'Mer. 67-17' and 'Mer. 68-10' at Weslaco, Tex. Zonate leaf spot was very conspicuous on 'Rio', 'Mer. 67-1', 'Mer. 67-14', 'Mer. 67-15' and 'Mer. 68-7' in the three Louisiana tests.

TABLE 1.—*Yield of stripped stalks per acre as percent of 'Rio'*

Location	Standard 'Rio' (T/A)	Test variety											
		'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 67-15'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 56-15'	'Mer. Brawley'	'Mer. 63-3'	'Mer. (Roma)'	'Mer. 65-2'	'Mer. 66-1'
<b>GEORGIA:</b>													
Cairo	12.5	118	70	146	119	86	78	—	—	—	—	—	—
<b>LOUISIANA:</b>													
Baton Rouge	13.8	127	67	117	110	93	78	—	—	—	—	—	—
Bossier City	13.2	138	53	105	101	77	82	—	—	—	—	—	—
Houma	18.4	93	62	106	94	70	72	—	—	—	—	—	—
Mean	15.1	119	62	109	102	80	77	—	—	—	—	—	—
<b>MISSISSIPPI:</b>													
Lorman	16.4	95	59	95	88	74	77	—	—	—	—	—	—
Meridian	21.0	101	65	112	100	76	82	—	—	—	—	—	—
Poplarville	11.0	114	38	125	130	69	60	—	—	—	—	—	—
State College	11.7	126	40	122	104	69	72	—	—	—	—	—	—
Stoneville	13.6	125	46	117	101	81	78	—	—	—	—	—	—
Mean	14.7	112	50	114	105	74	74	—	—	—	—	—	—
<b>TEXAS:</b>													
Lubbock	16.8	—	59	—	90	—	71	70	57	74	—	74	—
Weslaco	16.2	—	—	—	—	—	89	—	—	—	151	135	—
Mean	16.5	—	—	—	—	—	—	80	—	—	—	—	—
Mean of Means	14.7	116	60	89	104	80	77	70	57	74	151	135	74
													116

TABLE 2.—Soluble solids as percent of 'Rio'  
Test variety

TABLE 3.—Juice sucrose as percent of 'Rio'  
Test variety

TABLE 4.—Apparent purity as percent of 'Rio'

Location	Standard 'Rio' (Coefficient of apparent purity)	Test variety												
		'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 67-15'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 56-15'	'Brawley'	'Mer. 63-3'	'Mer. 64-3'	'Mer. 65-2'	'Mer. 'Roma'	'Mer. 66-1'
<b>GEORGIA:</b>														
Cairo	66.8	116	119	114	121	113	108	—	—	—	—	—	—	
<b>LOUISIANA:</b>														
Baton Rouge	77.1	89	107	100	100	103	99	—	—	—	—	—	—	
Bossier City	77.4	90	89	90	98	101	95	—	—	—	—	—	—	
Houma	76.2	97	95	95	100	101	100	—	—	—	—	—	—	
Mean	76.9	92	97	95	99	102	98	—	—	—	—	—	—	
<b>MISSISSIPPI:</b>														
Lorman	78.5	98	102	98	97	104	100	—	—	—	—	—	—	
Meridian	77.1	95	98	102	99	101	95	—	—	—	—	—	—	
Poplarville	78.0	96	103	98	96	98	95	—	—	—	—	—	—	
State College	78.5	98	108	104	99	105	108	—	—	—	—	—	—	
Stoneville	67.9	87	114	104	101	104	106	—	—	—	—	—	—	
Mean	76.0	95	105	101	98	102	101	—	—	—	—	—	—	
<b>TEXAS:</b>														
Tubbcock	80.3	—	104	—	99	—	95	102	97	103	—	98	103	
Veslaco	73.5	—	—	—	—	—	103	—	—	—	98	95	—	
Mean	76.9	—	—	—	—	—	99	—	—	—	—	—	90	
Mean of Means	74.2	101	106	103	104	106	102	102	97	103	98	95	103	90

TABLE 5.—Calculated sugar per ton as percent of 'Rio'

Location	Standard Ric (lb/T)	Test variety						'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 67-15'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 56-15'	'Mer. 63-3'	'Mer. 64-3'	'Mer. 65-2'	'Mer. 66-1'	'Mer. 66-1'			
		'Mer. 155.2	'Mer. 119	'Mer. 127	'Mer. 116	'Mer. 141	'Mer. 133															
<b>GEORGIA:</b>																						
Cairo	—	155.2	119	127	116	141	133	128	—	—	—	—	—	—	—	—	—	—	—	—	—	
<b>LOUISIANA:</b>																						
Baton Rouge	—	220.3	79	112	95	103	111	110	—	—	—	—	—	—	—	—	—	—	—	—	—	
Bossier City	—	227.7	73	78	73	98	108	101	—	—	—	—	—	—	—	—	—	—	—	—	—	
Houma	—	155.9	100	83	87	106	97	106	—	—	—	—	—	—	—	—	—	—	—	—	—	
Mean	—	201.3	84	91	85	102	105	106	—	—	—	—	—	—	—	—	—	—	—	—	—	
<b>MISSISSIPPI:</b>																						
Lorman	—	222.6	94	102	78	92	113	106	—	—	—	—	—	—	—	—	—	—	—	—	—	
Meridian	—	199.6	79	95	103	97	107	94	—	—	—	—	—	—	—	—	—	—	—	—	—	
Poplarville	—	213.5	91	95	97	97	88	91	—	—	—	—	—	—	—	—	—	—	—	—	—	
State College	—	219.8	91	115	101	100	116	115	—	—	—	—	—	—	—	—	—	—	—	—	—	
Stoneville	—	195.1	58	110	89	93	104	107	—	—	—	—	—	—	—	—	—	—	—	—	—	
Mean	—	210.1	83	103	94	96	106	103	—	—	—	—	—	—	—	—	—	—	—	—	—	
<b>TEXAS:</b>																						
Lubbock	—	239.6	—	102	—	95	—	—	100	103	107	97	—	96	—	—	109	—	—	—	—	
Weslaco	—	186.0	—	—	—	—	—	—	109	—	—	—	—	—	—	—	87	—	—	—	76	
Mean	—	212.8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Mean of Means	—	194.8	95	106	98	108	115	110	103	107	97	96	87	109	76	—	—	—	—	—	—	

TABLE 6.—Calculated sugar per acre as percent of 'Rio'

Location	'Rio' (lb./A)	Standard						Test variety					
		'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 67-15'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 68-15'	'Mer. 68-17'	'Mer. 63-3'	'Mer. 63-8'	'Mer. 65-2'	'Mer. 66-1'
GEORGIA:													
Cairo	1940	141	89	170	168	114	99	—	—	—	—	—	—
LOUISIANA:													
Baton Rouge	3040	100	75	111	114	103	85	—	—	—	—	—	—
Bossier City	3006	101	45	76	99	83	83	—	—	—	—	—	—
Houma	2868	93	52	92	100	67	77	—	—	—	—	—	—
Mean	2971	98	57	93	104	84	82	—	—	—	—	—	—
MISSISSIPPI:													
Lorman	3651	89	60	75	82	83	81	—	—	—	—	—	—
Meridian	4193	79	62	115	97	81	77	—	—	—	—	—	—
Poplarville	2348	104	36	121	127	61	55	—	—	—	—	—	—
State College	2572	115	46	124	104	80	82	—	—	—	—	—	—
Stoneville	2654	73	50	105	94	84	84	—	—	—	—	—	—
Mean	3034	92	51	108	101	78	76	—	—	—	—	—	—
TEXAS:													
Lubbock	4025	—	60	—	86	—	71	72	61	71	—	80	—
Weslaco	3013	—	—	—	—	—	97	—	—	—	144	117	89
Mean	3519	—	—	—	—	—	84	—	—	—	—	—	—
Mean of Means	2878	110	64	124	115	92	86	72	61	71	144	117	89

TABLE 7.—*Days from planting to harvest*

Location	Standard 'Rio'	Test variety						'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 68-15'	'Mer. 69-3'	'Mer. 64-3' (‘Roma’)	'Mer. 65-2'	'Mer. 66-1'	'Mer. 67-17'			
		'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 68-15'														
<b>GEORGIA:</b>																					
Cairo	115	142	115	142	142	115	115	—	—	—	—	—	—	—	—	—	—	—	—	—	
<b>LOUISIANA:</b>																					
Baton Rouge	155	155	124	155	155	124	124	—	—	—	—	—	—	—	—	—	—	—	—	—	
Bossier City	98	132	98	132	132	98	98	—	—	—	—	—	—	—	—	—	—	—	—	—	
Houma	140	153	140	140	140	140	140	—	—	—	—	—	—	—	—	—	—	—	—	—	
Mean	131	147	121	142	142	121	121	—	—	—	—	—	—	—	—	—	—	—	—	—	
<b>MISSISSIPPI:</b>																					
Lorman	119	153	119	153	153	119	119	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Meridian	122	127	115	127	122	115	115	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Poplarville	124	167	124	167	167	124	124	—	—	—	—	—	—	—	—	—	—	—	—	—	—
State College	153	153	125	153	153	125	125	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Stoneville	134	134	134	134	134	134	134	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mean	130	147	123	147	146	123	123	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<b>TEXAS:</b>																					
Lubbock	140	—	140	—	140	—	140	—	—	—	—	—	—	—	—	—	—	—	140	—	—
Weslaco	1112	—	—	—	—	—	—	—	93	—	—	—	—	—	—	—	—	—	106	—	—
Mean	126	—	—	—	—	—	—	—	—	116	—	—	—	—	—	—	—	—	—	—	—
Mean of Means	126	145	125	144	142	120	119	140	140	140	112	106	140	140	106	106	106	106	106	106	106

TABLE 8.—*Diseases rated 3 or 4 on 14 sweet sorghum sugar varieties<sup>1,2</sup>*

Location	'Rio'	Standard						Test variety							
		'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 67-15'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 56-15'	'Mer. 68-10'	'Mer. 63-3'	'Mer. 64-3'	'Mer. ('Roma')	'Mer. 65-2'	'Mer. 66-1'	'Mer. 67-17'
<b>GEORGIA:</b>															
Cairo	—	—	BS	—	—	—	—	—	—	—	—	—	—	—	—
<b>LOUISIANA:</b>															
Baton Rouge	ZLS	—	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	—
Bossier City	ZLS	—	RS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	—
Houma	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	—
<b>MISSISSIPPI:</b>															
Lorman	—	—	R	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	ZLS	—
Meridian	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Povertyville	—	—	—	—	—	A	—	—	—	—	—	—	—	—	—
State College	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Stoneville	—	—	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS	GLS
<b>TEXAS:</b>															
Lubbock	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Weslaco	GLS	—	—	—	—	—	—	—	—	—	—	—	—	—	R

<sup>1</sup> A = Anthracnose  
BS = Bacterial stripe  
GLS = Gray leaf spot  
INS = Insecticide injury  
R = Rust  
RS = Rough spot  
ZLS = Zonate leaf spot

<sup>2</sup> DISEASE GUIDE

1 = Disease present

2 = Disease quite noticeable, distributed over most or all of the area, but too slight to be considered of economic importance.

3 = Disease probably covers enough to cause reduction of quality or yield. Estimated leaf area destroyed probably up to 25 percent.

4 = Disease obviously responsible for some reduction in yield or quality. Leaf area destroyed estimated above 25 percent.